UC Merced

Title
A Contingent Response Analysis of Negative Feedback

Permalink

Journal

ISSN

Author
Corrigan-Halpern, Andrew

Publication Date
2004

Peer reviewed

A Contingent Response Analysis of Negative Feedback

Andrew Corrigan-Halpern (ahalpe1@uic.edu)
University of Illinois at Chicago, Chicago, IL

Introduction

Negative feedback is information provided by a teacher or other instructional agent given to correct the errors a learner has committed. One might expect that corrective feedback is effective because it helps learners alter their performance. In fact, it has been suggested that negative feedback should be given immediately, so that it can more easily be tied to the cognitive structures responsible for the error.

It is then expected that negative feedback decreases the chance of committing the same error in future situations when the error could occur (i.e. due to the *corrective effect*). While this position makes intuitive sense, it has been largely untested. Studies that compare a negative feedback group to control often use global performance measures and have not considered why feedback is effective. Feedback effects, when obtained, could be due to the corrective effect, or they might be due to other factors.

To consider the question more carefully, we tracked individual responses made in a learning experiment involving multiple trials. We provided feedback for some errors, but allowed others to go uncorrected. It was then possible to consider whether feedback facilitated the correction of errors.

Method

Task

A letter extrapolation task was used, similar to those used by Kotovsky and Simon (1973) and Restle (1970). To make letter extrapolation into a task with multiple opportunities to receive feedback, we presented the given sequence via several short presentations and asked for a response after each one. The subjects viewed the given sequence for 20 seconds, and then attempted to extrapolate it. They were asked to reproduce as much of it as they could, guessing the letters for which they were uncertain. They received feedback on their extrapolation as described below. Then the next trial (20 second study period, plus extrapolation attempt) began. The subjects went through 8 such trials.

The sequence used was [MKNPPNKMNLOQQOLN]. This pattern is composed of the four-letter chunk 'MKNP', which is then reversed to form the chunk 'PNKM'. The Chunks 'NLOQ' and 'QOLN' are translation of the other two chunks.

Feedback and Design

Two negative feedback conditions were used. In the *local* condition, feedback was given for each letter response. In the *global* condition, feedback was given for the 4-letter chunks below. Subjects were told that they would not receive feedback for all errors. They were instructed that a 'none' message would appear below some responses. This message appeared below 25% of all errors, as well as below all correct responses. When the subject received this message, they received no useful information. The study was completed on a Macintosh computer using the Pyscope software. Feedback was given after all responses were made and remained on the screen for 45 seconds.

Results

We have previously reported that subjects in the local condition outperform those in the global condition. (Corrigan-Halpern & Ohlsson, 2002). The current goal is to better understand the source of this effect.

Subjects in the global condition were significantly better at correcting errors after receiving feedback, $F_{(45,1)} = 4.59$, $p < .05$. After receiving negative feedback, subjects in the local condition corrected errors 26% of the time, compared to the global condition where correction occurred 32% of the time.

Subjects in the local group were more likely to correct errors after 'none' messages, $F_{(37,1)} = 68.46$, $p < .001$. After receiving the 'none' feedback, subjects in the local condition corrected errors 92% of the time, compared to 28% of the time for the global group.

Subjects in the local condition were more likely to maintain correct responses, $F_{(43,1)} = 5.02$, $p < .05$. Subject in the local condition reproduced a correct response 71% of the time, compared to 53% for the global condition.

Discussion

Despite the fact that the local feedback condition resulted in superior performance, this effect could not be attributed to the corrective effect. Subjects in the local condition perform well because they are able to correct errors made for responses where feedback was *not* provided. This result suggests that negative feedback achieves its effect indirectly or in a more cumulative fashion.

References

Corrigan-Halpern, A., & Ohlsson, S. (2002). Feedback effects in the acquisition of a hierarchical skill. In W. D. Gray, & C. D Schunn (Eds.) *Proceedings of the 24th Annual Conference of the Cognitive Science Society*, 226-231. Mahwah, NJ: Laurence Erlbaum Associates.

Kotovsky, K., & Simon, H. A. (1973). Empirical tests of a theory of human acquisition of concepts for sequential patterns. *Cognitive Psychology, 4(3)*, 399-424.

Restle, F. (1970). Theory of serial pattern learning: Structural trees. *Psychological Review, 77(6)*, 481-495.